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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: W. ALI	)	Examiner: L. BEHRINGER
Serial No.: 10/568,173	)	Art Unit: 3766
Filed: February 10, 2006	)	Confirmation: 6165
For: **A SYSTEM AND METHOD FOR DETECTING SIGNAL ARTIFACTS**	)	
Date of Last Office Action: March 17, 2010	)	
Attorney Docket No.: PHUS030273US2 / PKRZ 201286US01	)	Cleveland, OH 44114 August 6, 2010

APPEAL BRIEF

Commissioner For Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This is an Appeal from the Final Rejection of March 17, 2010.

The 37 CFR 41.31 Notice of Appeal with the requisite fee was filed June 10, 2010.

An authorization to charge the 37 CFR 41.20(b)(2) Appeal Fee to the applicant's Deposit Account accompanies this Brief.

CERTIFICATE OF ELECTRONIC TRANSMISSION

I certify that this **APPEAL BRIEF** and accompanying documents in connection with U.S. Serial No. 10/568,173 are being filed on the date indicated below by electronic transmission with the United States Patent and Trademark Office via the electronic filing system (EFS-Web).

August 6 2010
Date

Patricia A. Heim
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(i) REAL PARTY IN INTEREST

The Real Party in Interest is the Assignee, KONINKLIJKE PHILIPS ELECTRONICS, N.V.

(ii) RELATED APPEALS AND INTERFERENCES

None.

(iii) STATUS OF CLAIMS

Claims 1-16 are pending.

No claims have been cancelled.

Claims 1-16 stand rejected.

No claims stand allowed.

No claims stand confirmed, withdrawn, or object to.

Claims 1-16 are being appealed.

(iv) STATUS OF AMENDMENTS

Amendment E (After Final) of May 7, 2010 has been entered.

No other Amendments After Final have been filed.

(v) SUMMARY OF CLAIMED SUBJECT MATTER

1. A device comprising:

a controller **{21; p. 3, l. 5-12; p. 3, l. 31}**;

a memory **{22}** coupled to the controller **{p. 5, l. 5-12; p. 4, l. 28-29; p. 5, l. 1-5}**; and

an input interface which receives at least two event signals **{11; p. 4, l. 24 – p. 5, l. 16; p. 5, l. 5-12}**,

wherein the controller determines:

a global correlation matrix **{r_{global}}** for the at least two event signals **{11}** over a first period of time **{p. 3, l. 7-12; p. 5, l. 18-25}**,

a local correlation matrix **{r_{local}}** for the at least two event signals over a second period of time which is shorter than the first period of time **{p. 3, l. 8-12; p. 5, l. 26 – p. 6, l. 7}**,

a correlation vector **{D_i}** indicative of a deviation between the local correlation matrix and the global correlation matrix **{p. 3, l. 10-12; p. 6, l. 8-20}**,

an average **{$D_{average}$}** of the correlation vector **{D_i}**, and **{p. 3, l. 11-12; p. 6, l. 21-25}**

whether an artifact was detected in one of the at least two event signals **{11}** from the correlation vector **{D_i}** and the average **{$D_{average}$}** of the correlation vector **{p. 3, l.11-12; p. 7, l. 1-10}**.

2. The device according to Claim 1 wherein said device is a patient monitoring system **{p. 4, l. 3-9}**.

3. The device according to Claim 2 wherein said at least two event signals are monitored patient data signals **{P. 4, l. 3-9}**.

4. A patient monitoring system comprising:

a controller **{21; p. 3, l. 5-12; p. 3, l. 31}**;

a memory **{22}** coupled to the controller **{p. 5, l. 5-12; p. 4, l. 28-29; p. 5, l. 1-5}**;

an input interface configured to receive at least two event signals {**11**}, the at least two event signals being patient monitored data signals {**11; p. 4, l. 24 – p. 5, l. 16; p. 5, l. 5-12**};

wherein the controller determines whether an artifact is detected by: {**p. 3, l. 11-12**}

repeatedly determining a global correlation {$\mathbf{r_{global}}$} for the at least two event signals {**11**} over a first period of time, {**p. 5, l. 18-25**}

repeatedly determining a local correlation {$\mathbf{r_{local}}$} for the at least two event signals {**11**} over a second period of time which is shorter than the first period of time {**p. 5, l. 26 – p. 6, l. 7**},

repeatedly determining a current deviation {$\mathbf{D_i}$} between the local correlation and the global correlation, {**p. 6, l. 21-25**}

determining an average deviation {$\mathbf{D_{average}}$} of a plurality of the current deviations {$\mathbf{D_i}$}, and {**p. 6, l. 21-25**}

determining whether an artifact was detected in one of the at least two event signals {**11**} based on a difference between the current deviation {$\mathbf{D_i}$} and the average deviation {$\mathbf{D_{average}}$}; and {**p. 3, l. 11-12; p. 7, l. 1-16**}

an alarm indicator coupled to the controller {**21**}, the alarm indicator being triggered if at least one of the event signals {**11**} crosses a preset threshold value and the controller determines that no artifact was detected in the at least one event signal {**11; p. 7, l. 5-18**}.

5. The device according to Claim 1 further comprising a memory {**22**} for recording the at least two event signals {**11; p. 4, l. 28-29**}.

6. The device according to Claim 1, wherein said device includes a server forming part of a client-server network {**p. 4, l. 10-11**}.

7. A method for detecting a signal artifact in event signals, the method comprising the steps of:

receiving at least two event signals; {**11; p. 2, l. 30-31; p. 5, l. 6-16**}

determining a global correlation {r_{global}} for the at least two event signals {11} over a first period of time; **{p. 2, l. 31-32; p. 5, l. 18-25}**

determining a local correlation {r_{local}} for the at least two event signals {11}over a second period of time which is shorter than the first period of time; **{p. 2, l. 32 – p. 3, l. 1; p. 5, l. 26 – p. 6, l. 7}**

repeatedly determining a current deviation {D_i} between the local correlation {r_{local}} and the global correlation {r_{global}}; **{p, 3, l. 1-2; p. 6, l. 8-10}**

determining an average deviation {$D_{average}$} from a plurality of the determined current deviations; **{p. 2, l. 2-3; p. 6, l. 21-25}**

comparing the current deviation and the average deviation to determine whether an artifact was detected in one of the at least two event signals; **{p. 3, l. 3-4; p. 7, l. 1-10}** and

triggering an alarm indication in response to determining that an artifact was detected. **{p. 7, l. 5-18}**

8. The method according to Claim 7 wherein said method is used with a patient monitoring system. **{p. 4, l. 3-9}**

9. The method according to Claim 8 wherein said at least two event signals are monitored patient data signals. **{p. 4, l. 3-9}**

10. The method according to Claim 9, said method further comprising the step of:

providing the alarm indication in response to at least one of the event signals crossing a preset threshold value. **{p. 7, l. 5-18}**

11. The method according to Claim 7, said method further comprising the step of:

recording the at least two event signals. **{pp. 4, l. 28-29; p. 5, l. 6-12}**

12. The method according to Claim 7, wherein said method is used in a server forming part of a client-server network. **{p. 4, l. 10-11}**

13. A system for detecting a signal artifact in an event signal, comprising:

means **{22}** for receiving at least two event signals **{11; p. 4, l. 24 – p. 5, l. 16; p. 5, l. 5-12}**;

means **{21}** for determining a global correlation **{r_{global}}** for the at least two event signals **{11}** over a first period of time; **{p. 3, l. 7-12; p. 5, l. 18-25}**

means for determining a local correlation **{r_{local}}** for the at least two event signals **{11}** over a second period of time which is shorter than the first period of time; **{p. 3, l. 8-12; p. 5, l. 26 – p. 6, l. 7}**

means **{21}** for determining a deviation **{D_i}** between a local correlation vector **{r_{local}}** and a global correlation vector**{r_{global}}**; **{p. 3, l. 10-12; p. 6, l. 8-20}**

means **{21}** for determining an average deviation **{$D_{average}$}** from the deviation **{D_i}**; and **{p. 3, l. 11-12; p. 6, l. 8-20}**

means **{21}** for determining whether an artifact was detected in one of the at least two event signals **{11}** based upon the average deviation **{$D_{average}$}**. **{p. 3, l. 11-12; p. 7, l. 1-10}**

14. The system according to Claim 13 wherein said system is a patient monitoring system. **{p. 4, l. 3-9}**

15. The system according to Claim 14 wherein said at least two event signals are patient monitored data signals. **{p. 4, l. 3-9}**

16. The system according to claim 13 further including:

means **{30}** for monitoring at least one physiological parameter of a patient and generating the at least two event signals **{11}**, said at least two event signals conveying patient physiological parameter data. **{p. 4, l. 3-9 & 24-29}**

(vi) GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Whether claims 1 and 13 are anticipated in the sense of 35 U.S.C. § 102 by Shimauchi (US 5,661,813), particularly the acknowledged prior art as set forth in prior art Figure 6 and column 2, lines 9-37.

Whether claims 2-6 and 14-16 are patentable in the sense of 35 U.S.C. § 103 over Shimauchi as modified by Snyder (US 6,287,328).

Whether claims 7-12 are patentable in the sense of 35 U.S.C. § 103 over Snyder as modified by Shimauchi.

(vii) ARGUMENT

A. Claim 1 is Not Anticipated by the Acknowledged Prior Art (APA) as Summarized by Shimauchi

Shimauchi is directed to a multi-channel acoustic echo cancellation method and apparatus (column 1, lines 6-10). Briefly summarized, the received one or more signals, such as stereosignals $x_1(k)$ and $x_2(k)$ are applied to one or more loudspeakers, such as speakers 12_1 and 12_2. These signals echo off surrounding walls, etc. The echoes are received by one or more microphones, such as stereo microphones 16_1 and 16_2, presumably along with speech on the part of the user of the hands-free phone, although this is not mentioned by Shimauchi. To remove the echo, the Shimauchi APA subtracts an estimated echo $\hat{y}_m(k)$ at a subtraction node 21_m. If the estimated echo is accurate, then subtraction at node 21_m will eliminate the echo. On the other hand, there may be a residual echo $e_m(k)$. The residual error $e_m(k)$ is used to adjust the estimated echo path vector $\hat{h}_m(k)$, ideally until the estimated echo $\hat{y}_m(k)$ is exactly the same as the actual echo $y_m(k)$ and the residual error $e_m(k)$ is zero.

As set forth in Equation (1), in the case of a single microphone and speaker, the echo y(k) is equal to the sum of a weighting factor h(k,n) times the signal sampled at each of a plurality of preceding times x(k-n). As set forth in Equation (1), the echo is merely the sum of the earlier signal values x(k), x(k-1), ..., each weighted with the appropriate weighting factor h(k), h(k-1), ... As set forth in Equation (9) referenced by the Examiner in the Advisory Action, when there are m microphones, the weighting factor becomes a vector $\hat{h}_m(k)$. As set forth in Equation (11), the estimated echo $\hat{y}_m(k)$ for each of the m microphones is a vector equal to the transpose of the estimated echo path vector $\hat{h}_m(k)$ times the received signal x(k). That is to say, the received signal x at each of a plurality of sampling times k as applied to each speaker are weighted by the appropriate weighting factor and summed to produce the estimated echo $\hat{y}_m(k)$ received by the m^{th} microphone.

Claim 1 calls for an input interface which receives two event signals. In the Advisory Action, the Examiner indicated that he is interpreting $x_1(k)$ and $x_2(k)$ as received at terminals 11_1 and 11_2 as the two event signals.

Claim 1 goes on to call for a global correlation matrix for the two event signals over a first period of time. Shimauchi does not disclose a global correlation

matrix for input signals $x_1(k)$ and $x_2(k)$. The Examiner points to $X_n(k)$ of each channel in column 3, line 6 and asserts that X_n is a matrix. The applicant challenges the Examiner's assertion that $X_n(k)$ is a matrix. However, regardless whether $X_n(k)$ is a matrix or not, the X_n is a family of elements including, in the two signal embodiment, $X_1(k)$ for received signal $x_1(k)$ and $X_2(k)$ for the second received signal $x_2(k)$ received on line 11_2.

Further, Shimauchi has no interest in correlating signals $x_1(k)$ and $x_2(k)$. Shimauchi suggests that these two signals are probably different, such as the inputs of two stereo microphones, but makes no effort to determine any difference or correlation between $x_1(k)$ and $x_2(k)$.

Accordingly, $X_n(k)$ is not a global correlation matrix for event signals $x_1(k)$ and $x_2(k)$ over a first period of time.

Second, claim 1 calls for a local correlation matrix for the at least two event signals over a second period of time which is shorter than the first period of time. The Examiner does not identify a second matrix in Shimauchi, much less a local correlation matrix for signals $x_1(k)$ and $x_2(k)$. Indeed, Shimauchi does not disclose a second matrix, much less a local correlation matrix.

Moreover, k indicates discrete time and x(k) a received signal sample value at time k (column 1, lines 43-44). Operators $X_n(k)$, $x_n(k)$, $\hat{h}_m(k)$, all relate to the same time frame. Note, for example, Equation (7). Thus, Shimauchi does not disclose a second matrix over a second period of time which is shorter than the first period of time.

Accordingly, it is submitted that Shimauchi does not disclose a local correlation matrix (in addition to global correlation matrix) for signals $x_1(k)$ and $x_2(k)$ over a second period of time which is shorter than the first period of time (of the global correlation matrix).

Third, claim 1 calls for the controller to determine a correlation vector indicative of a deviation between the local correlation matrix and the global correlation matrix. Shimauchi does not determine a deviation between signals $x_1(k)$ and $x_2(k)$ or between a pair of matrices, one derived from $x_1(k)$ and the other derived from $x_2(k)$. Shimauchi does not determine differences between elements $X_1(k)$ or $X_2(k)$, much less versions of these elements obtained over different periods of time.

The Examiner fails to identify and indeed, it is submitted that Shimauchi does not disclose a correlation vector which is indicative of a deviation between local and global correlation matrices, each of which is over a different period of time.

Fourth, claim 1 calls for the controller to determine an average of the correlation vector. The Examiner fails to identify any average of a correlation vector in Shimauchi. Shimauchi does disclose several vectors, but none of which are indicative of a deviation between the local and the global correlation matrix. Moreover, Shimauchi does not suggest taking an average of any of these vectors. There is no suggestion in Shimauchi of determining an average of the received signal vector $x_n(k)$, or an average of the estimated echo vector $\hat{y}_m(k)$, or an average of the actual echo vector $y_m(k)$, or of the echo path vector $\hat{h}_m(k)$, or other vectors.

Thus, Shimauchi does not disclose determining an average of a correlation vector or any other vector.

Fifth, claim 1 calls for determining whether an artifact was detected in one of the two event signals from the correlation vector and the average of the correlation vector. In the Advisory Action, the Examiner asserts that the echo is the equivalent to an artifact. The applicant would assert that it is not the echo y(k) that is the artifact in Shimauchi, but rather the residual echo e(k). Regardless of whether one considers the echo y(k) or the residual echo e(k) to be the artifact, neither is detected in the two event signals $x_1(k)$ or $x_2(k)$. Thus, the "artifact" in Shimauchi is not detected in one of the received signals $x_1(k)$ and $x_2(k)$ which the Examiner has defined as the event signals. Rather, the echo signal y(k), which the Examiner asserts is an artifact, is the signal as actually picked-up by the microphone 16. The residual echo e(k), which the Examiner did not assert was the equivalent to an artifact, is the difference between the actual and estimated echo signals which is determined at node 21_m by subtractively combining the actual echo signal $y_m(k)$ and the estimated echo signal $\hat{y}_m(k)$ - a simple vector subtraction operation which does not involve determining a global correlation matrix, a local correlation matrix, a correlation vector, and an average of the correlation vector.

Accordingly, it is submitted that Shimauchi does not disclose determining whether an artifact was detected in one of at least two event signals from a correlation vector and an average of the correlation vector.

Accordingly, it is submitted that claim 1 is not anticipated by Shimauchi. It is further submitted that the rejection of dependent claims 2, 3, 5, and 6 dependent on claim 1 is erroneous and should be reversed.

B. Claims 2 and 3 Distinguish Patentably Over Shimauchi and Snyder

First, it is submitted that Shimauchi does not disclose any of the limitations of claim 1 discussed above.

Claim 2 calls for the device to be a patient monitoring system, particularly at column 4, lines 42-47. The Examiner does not assert and, indeed, Snyder does not cure any of the shortcomings of Shimauchi discussed in conjunction with parent claim 1.

Moreover, it is submitted that there is no teaching or apparent reason why one would put ECG, EEG, temperature, or the other biological function or activity signals referenced in column 4, lines 42-47 of Snyder into the echo cancellation circuit of Shimauchi. There is no teaching that such patient parameters are subject to echo problems. There is no apparent reason either in Snyder, Shimauchi, or the combination why one would try to remove echoes from biological function or activity signals of the monitor of Snyder.

The Examiner refers the applicant to page 4, lines 12-20 of the present application. However, whether two references are properly combinable is properly determined by the references themselves and not by the present application. The test for obviousness to combine is based on the combined references themselves. Some disclosure in the references themselves mush teach or motivate the reader to combine the applied references. It is submitted that it is improper to use the present application as if it were a third piece of prior art to try to derive therefrom a teaching or motivation to combine other references. Obviousness is determined at the time the application was filed, not from the teachings of the applicant.

Accordingly, it is submitted that claim 2 and claim 3 dependent therefrom distinguish patentably over the references of record.

C. Claim 3 Distinguishes Patentably Over the References of Record

Claim 3 calls for the two event signals to be monitored patient data signals. Although Snyder does disclose biological function or activity signals, the Examiner has failed to show where in Snyder or Shimauchi, or why it would have been otherwise known in the art at the time the present application was filed, to input biological function or activity signals into the inputs 11_1, 11_2, ... of the echo cancellation circuit of Shimauchi. The Examiner has failed to explain why one would try to remove echoes from signals which have no echoes.

Accordingly, it is submitted that claim 3 distinguishes patentably and unobviously over the references of record.

D. Claim 5 Distinguishes Patentably Over Shimauchi as Modified by Snyder

First, as discussed in connection with claim 1, Shimauchi does not disclose the elements of parent claim 1. Second, for the reasons set forth above, it is submitted that the Examiner has failed to show any teaching, known to those of ordinary skill in the art at the time the present application was filed, which would suggest using the echo cancellation circuit of Shimauchi to process the biological function or activity signals of Snyder.

E. Claim 6 Distinguishes Patentably Over Shimauchi as Modified by Snyder

Again, Shimauchi fails to disclose the claimed elements of claim 1 for the reasons set forth above. Second, the Examiner has made no showing as to how those of ordinary skill in the art would have been taught, at the time that the present application was filed, to input the biological function or activity signals of Snyder into the echo cancellation circuitry of Shimauchi.

Accordingly, it is submitted that claim 6 distinguishes patentably and unobviously over the references of record.

F. Claim 4 Distinguishes Patentably Over Shimauchi as Modified by Snyder

Claim 4 calls for an input interface configured to receive at least two event signals, the two event signals being patient monitored data signals. It is submitted that there is no apparent reason why or any teaching in Snyder or Shimauchi that would lead one to input the biological function or activity signals of Snyder into the inputs 11_1, 11_2, ... of the echo cancellation circuit of Shimauchi.

Second, claim 4 calls for the controller to determine an artifact. The Examiner asserts that the echo signal $y_m(k)$ is the equivalent of an artifact. However, the echo signal of Shimauchi is the signal which is picked up by the microphone 16_m and is not determined by a controller or other processor. Snyder was not cited as and indeed does not cure this shortcoming of Shimauchi.

Third, claim 4 calls for determining a global correlation for the at least two event signals over a first period of time. Shimauchi does not disclose determining a global correlation for the input signals $x_n(k)$, much less over a first period of time. Snyder was not cited as and indeed does not cure this shortcoming of Shimauchi.

Fourth, claim 4 calls for repeatedly determining a local correlation for the at least two event signals over a second period of time which is shorter than the first period of time. Again, Shimauchi does not determine a correlation between the received signals $x_n(k)$ nor does Shimauchi teach or fairly suggest determining both a local correlation and a global correlation for the received signals $x_n(k)$. Moreover, Shimauchi does not disclose determining correlations between the received signals x_1 and x_2 over a longer and a shorter period of time. Snyder was not cited as and indeed does not cure this shortcoming of Shimauchi.

Fifth, claim 4 calls for repeatedly determining a current deviation between the local and global correlations. The Examiner has failed to show and indeed Shimauchi does not disclose determining a deviation between local and global correlations. More specifically, Shimauchi does not disclose or fairly suggest repeatedly determining a deviation between two correlations for the received signals $x_n(k)$. Snyder was not cited as and indeed does not cure this shortcoming of Shimauchi.

Sixth, claim 4 calls for the controller to determine an average deviation of the plurality of current deviations. The Examiner has failed to show and indeed Shimauchi does not disclose determining an average deviation, much less an average deviation of plurality of current deviations. Shimauchi does not determine deviations between the received signals $x_n(k)$ nor does Shimauchi disclose or fairly suggest determining an average of a deviation between other signals such as the echo signal $y_m(k)$, the residual echo signal $e_m(k)$, or the like. Snyder was not cited as and indeed does not cure these shortcomings of Shimauchi.

Seventh, claim 4 calls for determining whether an artifact was detected in one of the at least two event signals based on a difference between the current deviation and the average deviation. Shimauchi does not determine or detect an artifact in one of the received signals $x_n(k)$ nor does Shimauchi disclose determining whether an artifact is detected based on a difference between the current deviation and the average deviation. The echo signal $y_m(k)$ which the Examiner identifies as the equivalent of an artifact is measured by the microphone and is not determined, much less determined, based on the difference between a current and average deviation. Indeed, none of the other vectors in Shimauchi is disclosed as being determined based on a difference between a current and average deviation. Snyder was not cited as, and indeed, does not cure this shortcoming of Shimauzu.

The Examiner refers the applicant to column 7, lines 55-63 of Snyder. However, this portion of Snyder does not disclose triggering an alarm if an event signal crosses a preset threshold value. Rather, this section of Snyder relates to a technique for indicating the probability of an artifact which uses a fuzzy membership function or Boolean indicator, i.e., an artifact probability indication process which is different from the process set forth in the present application and the echo signal correction process of Shimauchi.

Accordingly, it is submitted that claim 4 distinguishes patentably and unobviously over the references of record.

G. Claims 7-12 Distinguish Patentably Over Shimauchi as Modified by Snyder

The Examiner concedes that Snyder does not disclose a method of determinine an artifact corruption as claimed in the present application, i.e., that Snyder does not disclose the steps set forth in claim 7 of the present application. The applicant agrees that the present application uses a different technique for detecting artifacts.

The Examiner asserts that Shimauchi teaches determining an artifact, particularly an echo corruption. In Shimauchi, the echo $y_m(k)$ is measured by the microphone and is not determined or calculated.

Moreover, as discussed above, Shimauchi does not disclose repeatedly determining a global correlation between the received signals $x_n(k)$ over a first period of time nor determining a local correlation between the received signals $x_n(k)$ over a second period of time which is shorter than the first period of time, nor repeatedly determining a current deviation between the local and global correlations, nor determining an average deviation from the plurality of determined current deviations, nor comparing current and average deviations to determine when an echo or other artifact was detected in one of the received signals $x_n(k)$. Shimauchi does not determine whether an artifact is detected in one of the received signals $x_n(k)$ which are received at inputs 11_1, 11_2, ...

Further, there is no suggestion in either Snyder or Shimauchi that the biological function or activity signals of Snyder have an echo or other artifact which would or could be removed using the echo cancellation technique of Shimauchi.

Further, claim 7 calls for triggering an alarm indication in response to determining that an artifact was detected. The Examiner asserts that triggering an alarm in response to determining that an artifact was detected is disclosed in the abstract of Snyder. The abstract of Snyder does not disclose triggering an alarm indication. At best, the abstract of Snyder discloses producing an indication of signal corruption. As set forth in column 7, lines 43-44, this indication may be of a degree of corruption. That is, Snyder discloses indicating the degree or probability of corruption, but does not disclose triggering an alarm if this degree or probability exceeds a threshold.

Accordingly, it is submitted that claim 7 and claims 8-12 dependent therefrom distinguish patentably and unobviously over the references of record.

H. Claim 10 Distinguishes Patentably Over Snyder as Modified by Shimauchi

Claim 10 calls for providing the alarm indication in response to at least one of the event signals crossing a preset threshold value. The Examiner refers the applicant to column 7, lines 55-63 of Snyder. However, this section of Snyder suggests providing an indication of the probability of an artifact, but does not disclose providing an alarm indication in response to one of the biological function or activity signals crossing a preset threshold.

Accordingly, it is submitted that claim 10 distinguishes patentably and unobviously over the references of record.

I. Claim 13 is Not Anticipated by Shimauchi

Claim 13 calls for means for performing each of the steps set forth in lines 3-13 of claim 7. The Examiner identifies signals $x_n(k)$ of Shimauchi as the signals which are being taken as the received event signals.

The Examiner has failed to identify in Shimauchi any means which determines a global correlation between the received signals $x_n(k)$ over a first time period nor any means which determines a local correlation between the received signals $x_n(k)$ over a second period of time which is shorter than the first. Shimauchi does not try to determine any correlation between the received signals $x_1(k)$, $x_2(k)$, ... The received signals $x_n(k)$ are used in trying to generate an estimated echo vector $\hat{y}_m(k)$ of Shimauchi. But nowhere in determining the estimated echo does Shimauchi disclose determining either a local or global correlation between the input signals $x_n(k)$, much less generating such correlations over two different periods of time.

Claim 13 further calls for a means for determining a deviation between a local correlation vector and a global correlation vector. In Shimauchi, node 21_m subtractively combines the actual echo $y_m(k)$ and the estimated echo $\hat{y}_m(k)$. However, the actual and estimated echoes are not global or local correlation vectors.

Claim 13 further calls for means for determining an average deviation. In Shimauchi, the difference between the actual and estimated echoes is the residual echo vector $e_m(k)$, but there is no suggestion of determining an average of the residual echo.

Claim 13 calls for a means for determining whether an artifact was detected in one of the event signals based on the average deviation. Shimauchi does not determine whether there is an artifact in one of the received signals $x_n(k)$, which the Examiner identifies as the claimed event signals. Moreover, Shimauchi does not disclose determining whether an artifact was detected in any one of the disclosed signals based on an average deviation.

Accordingly, it is submitted that claim 13 is not anticipated by Shimauchi.

J. Claims 13 and 14 are Not Anticipated by Shimauchi as Modified by Snyder

Because there is no suggestion in either Snyder or Shimauchi that the biological function or activity signals of Snyder suffer an echo problem, it is submitted that there is no teaching in Snyder, Shimauchi, or other suggestion that those of ordinary skill in the art, at the time the present application was filed, should input the biological function and/or activity signals of Snyder into the echo cancellation circuit of Shimauchi.

Accordingly, it is submitted that claim 13 and claim 14 dependent therefrom distinguish patentably and unobviously over the references of record.

K. Claim 15 Distinguishes Patentably Over Shimauchi as Modified by Snyder

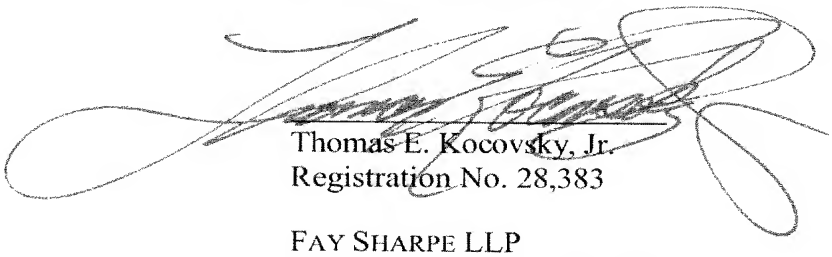
Because there is no suggestion in either Snyder or Shimauchi that the biological function or activity signals of Snyder suffer an echo problem, it is submitted that there is no teaching in Snyder, Shimauchi, or other suggestion that those of ordinary skill in the art, at the time the present application was filed, should input the biological function and/or activity signals of Snyder into the echo cancellation circuit of Shimauchi.

Accordingly, it is submitted that claim 15 distinguishes patentably and unobviously over the references of record.

L. Conclusion

First the reasons set forth above, it is submitted that no claim is anticipated by Shimauchi nor is any claim rendered unpatentable by the combination of Shimauchi as modified by Snyder, or Snyder as modified by Shimauchi. An early reversal of all of the Examiner's rejections is requested.

Respectfully submitted,



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(viii) CLAIMS APPENDIX

1. (Rejected) A device comprising:

a controller;

a memory coupled to the controller; and

an input interface which receives at least two event signals,

wherein the controller determines:

a global correlation matrix for the at least two event signals over a first period of time,

a local correlation matrix for the at least two event signals over a second period of time which is shorter than the first period of time,

a correlation vector indicative of a deviation between the local correlation matrix and the global correlation matrix,

an average of the correlation vector, and

whether an artifact was detected in one of the at least two event signals from the correlation vector and the average of the correlation vector.

2. (Rejected) The device according to Claim 1 wherein said device is a patient monitoring system.

3. (Rejected) The device according to Claim 2 wherein said at least two event signals are monitored patient data signals.

4. (Rejected) A patient monitoring system comprising:

a controller;

a memory coupled to the controller;

an input interface configured to receive at least two event signals, the at least two event signals being patient monitored data signals;

wherein the controller determines whether an artifact is detected by:

repeatedly determining a global correlation for the at least two event signals over a first period of time,

repeatedly determining a local correlation for the at least two event signals over a second period of time which is shorter than the first period of time,

repeatedly determining a current deviation between the local correlation and the global correlation,

determining an average deviation of a plurality of the current deviations, and

determining whether an artifact was detected in one of the at least two event signals based on a difference between the current deviation and the average deviation; and

an alarm indicator coupled to the controller, the alarm indicator being triggered if at least one of the event signals crosses a preset threshold value and the controller determines that no artifact was detected in the at least one event signal.

5. (Rejected) The device according to Claim 1 further comprising a memory for recording the at least two event signals.

6. (Rejected) The device according to Claim 1, wherein said device includes a server forming part of a client-server network.

7. (Rejected) A method for detecting a signal artifact in event signals, the method comprising the steps of:

receiving at least two event signals;

determining a global correlation for the at least two event signals over a first period of time;

determining a local correlation for the at least two event signals over a second period of time which is shorter than the first period of time;

repeatedly determining a current deviation between the local correlation and the global correlation;

determining an average deviation from a plurality of the determined current deviations;

comparing the current deviation and the average deviation to determine whether an artifact was detected in one of the at least two event signals; and

triggering an alarm indication in response to determining that an artifact was detected.

8. (Rejected) The method according to Claim 7 wherein said method is used with a patient monitoring system.

9. (Rejected) The method according to Claim 8 wherein said at least two event signals are monitored patient data signals.

10. (Rejected) The method according to Claim 9, said method further comprising the step of:

providing the alarm indication in response to at least one of the event signals crossing a preset threshold value.

11. (Rejected) The method according to Claim 7, said method further comprising the step of:

recording the at least two event signals.

12. (Rejected) The method according to Claim 7, wherein said method is used in a server forming part of a client-server network.

13. (Rejected) A system for detecting a signal artifact in an event signal, comprising:

means for receiving at least two event signals;

means for determining a global correlation for the at least two event signals over a first period of time;

means for determining a local correlation for the at least two event signals over a second period of time which is shorter than the first period of time;

means for determining a deviation between a local correlation vector and a global correlation vector;

means for determining an average deviation from the deviation; and

means for determining whether an artifact was detected in one of the at least two event signals based upon the average deviation.

14. (Rejected) The system according to Claim 13 wherein said system is a patient monitoring system.

15. (Rejected) The system according to Claim 14 wherein said at least two event signals are patient monitored data signals.

16. (Rejected) The system according to claim 13 further including:

means for monitoring at least one physiological parameter of a patient and generating the at least two event signals, said at least two event signals conveying patient physiological parameter data.

(ix) EVIDENCE APPENDIX

None.

(x) RELATED PROCEEDINGS APPENDIX

None.